

Most of you learned to fly behind a carburetted AVGAS engine with a throttle, a mixture knob and a propeller lever. Forget all three habits here. The DA-42 NG is a *diesel* — it burns jet fuel by compression ignition, it is run by a computer, and you control the whole thing with one lever. This chapter is about that engine, the gearbox behind it, and the constant-speed feathering propeller in front. Get the RPM and power limits into your memory, because they carry straight through to the limitations paper.

2.1 What kind of engine is it?

Each nacelle holds an Austro Engine E4-B: a liquid-cooled, four-cylinder, four-stroke, in-line engine with wet-sump lubrication. It is turbocharged with an intercooler, it uses common-rail direct injection, and it ignites by compression — there are no spark plugs and no magnetos. Because it is a diesel, it runs on Jet A-1, not AVGAS, which is one of the type's biggest operating advantages: jet fuel is cheaper and available everywhere airliners fly.

The engine does not drive the propeller directly. A reduction gearbox with a ratio of **1 : 1.69** sits between them, so the propeller always turns slower than the crankshaft. Every RPM figure published for this aircraft is **propeller** RPM — keep that straight, or the limits won't make sense.

IN PLAIN ENGLISH

Diesel, jet fuel, compression ignition, turbocharged, common-rail, computer-controlled, geared to the propeller. No mixture control, no carburettor heat, no magneto checks — those concepts simply don't exist on this aeroplane.

2.2 The EECU — the brain

The engine is managed by an Electronic Engine Control Unit (the EECU, often just "the ECU"). It reads the sensors — manifold pressure, rail pressure, temperatures, RPM, power-lever position — and it sets the fuelling, the turbocharger wastegate and the propeller pitch to deliver the power you asked for. You do not manage any of that by hand.

For redundancy there are **two ECUs per engine**, called ECU A and ECU B. A VOTER switch for each engine normally sits in **AUTO**, letting the system choose which ECU is in charge. If one fails, the system should switch automatically to the other; you can also force ECU A or B manually, but

that is an emergency action only. On the ground, with the power lever at idle and low RPM, an ECU TEST button runs a self-check that cycles between the two ECUs.

WHY IT MATTERS

Because the ECU needs electrical power to run the engine, the electrical system and the engine are far more intertwined than on a piston trainer. That is why the aircraft carries dedicated ECU backup batteries — you'll meet them in the electrical chapter. A total electrical failure is an engine problem here, not just a lost-radio problem.

2.3 Power and RPM limits

These are the numbers the examiner loves. Learn them exactly.

Setting	Limit
Maximum take-off power	100% (≈ 123.5 kW), at 2300 propeller RPM — 5 minutes maximum
Maximum continuous power	92% (≈ 114 kW), at 2100 propeller RPM
Maximum overspeed	2500 propeller RPM — 20 seconds maximum
Reduction gear ratio	1 : 1.69

MEMORY HOOK

23 / 21 / 25 — take-off 2300 (5 min), continuous 2100, never-exceed overspeed 2500 (20 sec). Take-off power is time-limited; continuous is what you can hold all day.

2.4 The propeller

Each engine drives a three-blade, constant-speed, fully-feathering MT propeller with wood-composite blades. It is hydraulically operated, but the oil is directed by the ECU through the governor — you do not have a separate blue propeller lever to pull. Increasing oil pressure into the hub drives the blades to a *finer* pitch and higher RPM; reducing it drives them *coarser* and slower.

Feathering — the whole point of it

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On a twin, the deadliest drag comes from a stopped engine's propeller windmilling. Feathering turns the blades edge-on to the airflow so the dead propeller stops and stops fighting you. On this aircraft you feather by shutting the engine down with its ENGINE MASTER switch — that releases the hub oil and lets the blades drive to the feather position.

CRITICAL LIMIT

Feathering is only possible above about **1300 propeller RPM**. If the engine is shut down below that, the blades stay at the fine "start-lock" pitch and will not feather. In a real failure you feather promptly, while the propeller is still turning fast — hesitate and you may lose the option.

Unfeathering and the accumulator

To restart and unfeather in flight, the ENGINE MASTER is set back ON. A nitrogen-oil pressure accumulator, charged to roughly 22 bar during normal running, pushes the blades out of feather so the propeller starts to windmill and the engine can be restarted. A governor failure or loss of gearbox oil pressure drives the propeller *towards* feather automatically — a fail-safe that protects you from a runaway overspeed.

2.5 The single power lever

One lever per engine sets the demanded power as a percentage of LOAD. Fully forward is MAX (full power); fully back is IDLE. Everything between — manifold pressure, fuel, propeller RPM — is resolved by the ECU. Move the lever smoothly; slamming it produces rapid RPM changes that the light wooden blades respond to sharply.

2.6 Starting, temperatures and fire protection

Being a diesel, the engine uses glow plugs, not spark plugs, and the ECU manages a pre-heat sequence before cranking. Two fuel-temperature gates matter: the engine may only be started above a minimum fuel temperature, and take-off power is only permitted above a (higher) take-off fuel temperature. The maximum fuel temperature is **60 °C**.

An overheat detector in each engine bay triggers a fire warning on the flight display if the compartment temperature climbs above about **250 °C**. You test it on the ground as part of the pre-flight checks; if the warning does not appear on test, the aircraft needs maintenance before flight.

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2.7 Where this leads

You now understand the heart of the aeroplane: a computer-run, geared, turbo-diesel twin with feathering propellers. Two threads run out of this chapter — the *fuel system* that feeds it (next chapter) and the *electrical system* that keeps the ECUs alive (the chapter after). Both are more critical on this type than on anything you have flown before, precisely because the engine cannot run without them.

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